

WHAT IS CLAIMED IS:

- 1 1. A multiple position switch assembly comprising:
2 first and second switch modules, each switch module having a base
3 and two control elements movably connected to the base, each switch module further
4 having two switching elements respectively associated with the control elements of
5 the switch module; and
6 an actuator associating the control elements of the first switch module
7 with one another in a first pair and associating the control elements of the second
8 switch module with one another in a second pair;
9 wherein the control elements and the base of each switch module are
10 operative to enable the first and second switch modules to be combined with one
11 another to form a four position switch subassembly in response to the switch
12 modules being interconnected to one another while being positioned against a
13 connection area of the respective bases;
14 wherein in the four position switch subassembly the first pair of
15 control elements of the first module are arranged to be actuated by the actuator in
16 a first set of two opposite movement directions, and the second pair of control
17 elements of the second module are arranged to be actuated by the actuator in a
18 second set of two opposite movement directions, wherein the first and second sets
19 of opposite movement directions are perpendicular to one another.
- 1 2. The assembly of claim 1 wherein:
2 the first and second switch modules are substantially identical.
- 1 3. The assembly of claim 1 wherein:
2 the control elements of the first and second switch modules have
3 control surfaces;
4 wherein in the four position switch assembly the bases and the control
5 elements of the switch modules are configured such that the control surfaces of the
6 control elements lie in a first plane while the bases lie in a second plane.
- 1 4. The assembly of claim 3 wherein:

2 the connection areas of the bases of the first and second switch
3 modules are complementary to one other.

1 5. The assembly of claim 1 wherein:
2 the control elements are levers pivotally connected to the respective
3 bases through an articulated connection such that the control elements have an
4 antiparallel orientation with the connections being parallel to the longitudinal
5 extensions of the control elements on one side, and perpendicular to the connections
6 on the other side thereby forming a rectangular open space between the control
7 elements;

8 wherein the bases each include a first area accepting the connection
9 of one of the control elements of each pair of control elements, and a second area
10 accepting the connection of the other one of the control elements of each pair of
11 control elements, and the connection area which spans the first and second areas and
12 lies within the open space.

1 6. The assembly of claim 1 wherein:
2 the connection areas of the bases overlap in the four position switch
3 subassembly.

1 7. The assembly of claim 1 wherein:
2 the switch modules have symmetry about a point of symmetry in the
3 four position switch subassembly.

1 8. The assembly of claim 5 wherein:
2 the first area and the second area of each respective base accepts the
3 switching elements associated with the respective control elements.

1 9. The assembly of claim 5 wherein:
2 the outer contours of the first and second areas follow projections of
3 the control elements onto the respective bases.

1 10. The assembly of claim 5 wherein:

2 the connection areas of the bases are formed by connection bars.

1 11. The assembly of claim 5 wherein:
2 the bases have a relatively small material thickness in the connection
3 areas such that in the four position switch assembly the bases lie in a plane.

1 12. The assembly of claim 1 wherein:
2 the switching elements are elastic contact elements of a switch mat.

1 13. The assembly of claim 12 wherein:
2 the switching elements are connected with at least one of free ends
3 of the control elements and the base.

1 14. The assembly of claim 1 wherein:
2 the switching elements are microswitches.

1 15. The assembly of claim 1 wherein:
2 the switching elements are switch springs.

1 16. The assembly of claim 1 wherein:
2 one end of the control elements are movably connected with the
3 respective bases through hinge joints in order for the control elements to pivot about
4 the hinge joints.

1 17. The assembly of claim 1 wherein:
2 one end of the control elements are movably connected with the
3 respective bases through axles in order for the control elements to rotate about
4 rotational axes of the axles.

1 18. The assembly of claim 17 wherein:
2 one end of the control elements are movably connected with the
3 respective bases through injection molding material.

1 19. The assembly of claim 1 wherein:
2 the control elements and the bases have stop elements which are
3 arranged such that when one control element in a pair is actuated the other control
4 element in the pair is pressed against the associated stop element by the switching
5 element associated with the other control element.

1 20. The assembly of claim 1 wherein:
2 the actuator includes an internal control part which is movable on two
3 perpendicular axes of rotation.

1 21. The assembly of claim 20 wherein:
2 the actuator further includes an external control part, wherein the
3 internal control part is mounted in the external control part to be rotatable in the
4 external control part.

1 22. The assembly of claim 1 wherein:
2 the actuator is mounted to one of the switch modules in order to
3 rotate in the switch module and thereby actuate the control elements in the
4 movement directions when the first and second switch modules are combined to
5 form the four position switch subassembly.

1 23. The assembly of claim 22 wherein:
2 the actuator is mounted to the switch module by a multi-component
3 injection molding process.

1 24. The assembly of claim 12 wherein:
2 the switch mat has latching means which cooperate with associated
3 means of mating for the latch on one of the switch modules.

1 25. The assembly of claim 20 wherein:
2 the internal control part has an extension which passes through an
3 open space between the control elements.

1 26. The assembly of claim 25 wherein:
2 the extension is guided in an associated link guide along specified link
3 paths that are oriented in the shape of a cross.

1 27. The assembly of claim 26 wherein:
2 the extension is mounted to move axially on the internal control part
3 to actuate a pushing function.

1 28. The assembly of claim 27 wherein:
2 the extension has signal transmitters for converting the axial motion
3 into electrical signals.

1 29. The assembly of claim 1 further comprising:
2 the switching elements are connected to light sources for indicating
3 the state of the switching elements.

1 30. The assembly of claim 20 wherein:
2 the internal control part includes light conducting elements.

1 31. The assembly of claim 20 wherein:
2 the internal control part is a light-conducting element.

1 32. The assembly of claim 1 wherein:
2 the actuator and the switch modules are produced in the same tool
3 using a multi-component injection molding technique such that after the injection
4 molding material hardens the actuator and the control elements are movably
5 mounted in the subassembly.

1 33. A switch module for a multiple position switch assembly, the
2 switch module comprising:
3 a base;
4 two control levers pivotally connected to the base;

5 two switching elements respectively associated with the control
6 levers; and
7 an actuator that is movable in opposite directions in order to
8 alternately actuate the control levers such that the control levers pivot and actuate
9 the switching elements upon being actuated by the actuator;
10 wherein the control levers are arranged on the base next to one
11 another in an antiparallel orientation;
12 wherein the opposite directions of movement of the actuator subtend
13 a specified angle with the longitudinal extension of the control levers.

1 34. The module of claim 33 wherein:
2 the specified angle is 90°.

1 35. The module of claim 33 wherein:
2 the control levers are pivotally connected with the base by an axle
3 connection.

1 36. The module of claim 35 wherein:
2 the control levers are pivotally connected with the base through
3 injection molding material.

1 37. The module of claim 33 wherein:
2 the switching elements are elastic contact elements of a switch mat.

1 38. A switch module for a multiple position switch assembly, the
2 switch module comprising:
3 a base;
4 two control elements movably mounted to the base;
5 two switching elements respectively associated with the control
6 elements; and
7 an actuator that is movable in opposite directions in order to
8 alternately actuate the control elements such that the control elements move and
9 actuate the switching elements upon being actuated by the actuator;

10 wherein the control elements are axially movable slides having
11 control bevels which actuate the switching elements upon the control elements being
12 actuated by the actuator;

13 wherein the control elements are arranged on the base next to one
14 another in an antiparallel orientation;

15 wherein the opposite directions of movement of the actuator subtend
16 a specified angle with the longitudinal extension of the control elements.

1 39. The module of claim 38 wherein:
2 the specified angle is 90°.

1 40. The module of claim 38 wherein:
2 the control elements are movably mounted with the base through
3 injection molding material.

1 41. The module of claim 38 wherein:
2 the switching elements are elastic contact elements of a switch mat.